Radiation Protection

A-4J-0020

ASO-19

September 4, 2016

EOs

- **EO #19-1 IDENTIFY the various elements of the Radiation Protection Program**
- **EO #19-2 DEFINE the duties and responsibilities of the Safety Officer within the Radiation Protection Program**
- **EO #19-3 DEFINE the responsibilities of the Laser Safety Officer**
- **EO #19-4 DESCRIBE the spaces on board ship with radiofrequency radiation or laser safety hazards**

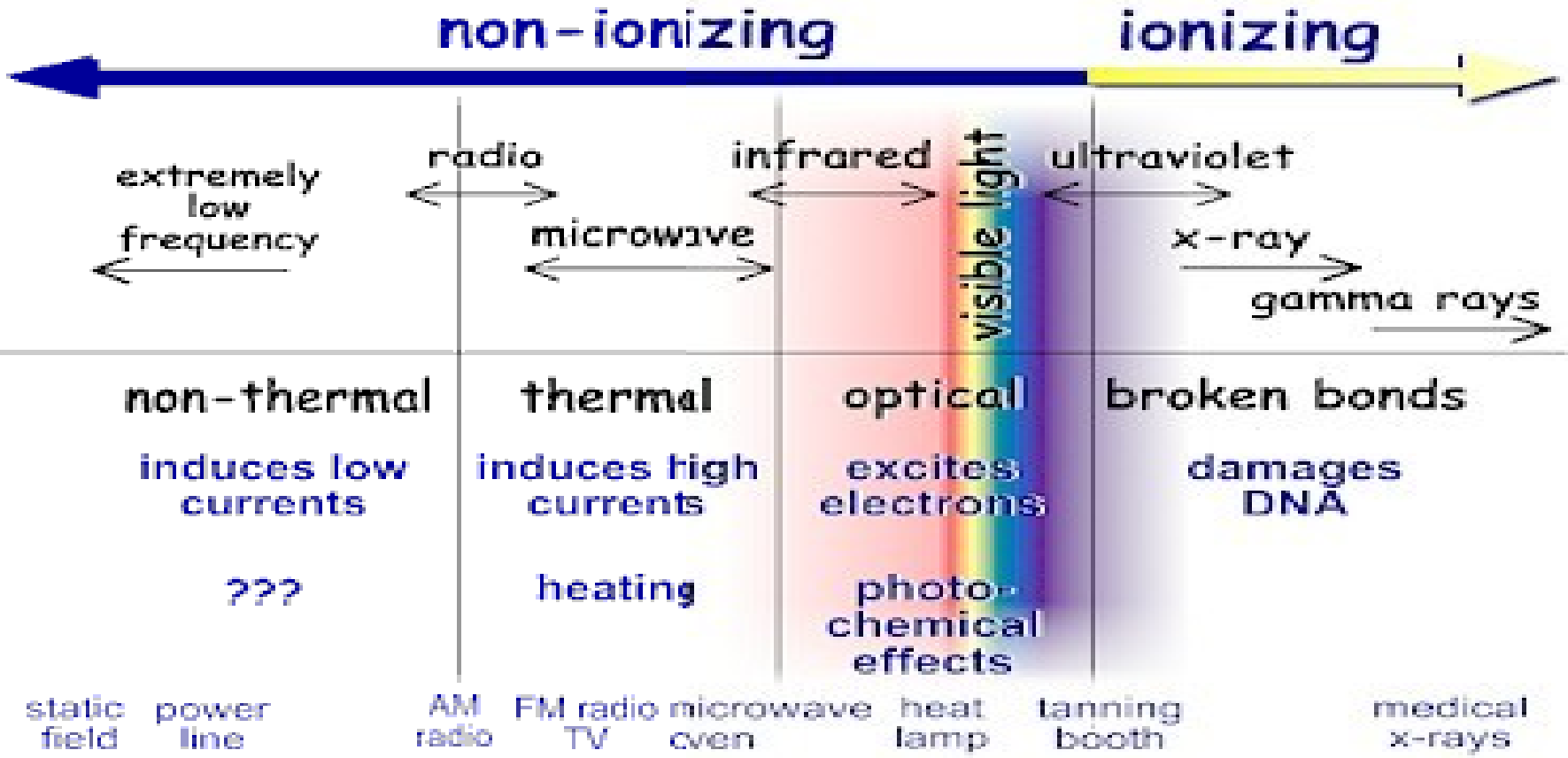
References

- OPNAVINST 5100.19E
- NAVSEA OP-3565, Hazards of Electromagnetic Radiation
- ANSI Z136.1 – 2000, American National Standard for the Safe Use of Lasers
- NAVMED P-5055, Radiation Health Protection Manual
- OPNAVINST 5100.27B Navy Laser Hazards Control Program

Safety Officer Responsibilities

- **Ensure Radiation Program is evaluated for compliance and effectiveness**
  - **Review RADHAZ survey**
  - **CO should appoint a Laser System Safety Officer and Radiation Safety Officer if required**
- **New RADHAZ survey needed**
  - **When new emitters added**
  - **Watchstations or work areas moved near emitters**
  - **Personnel injured by radiation exposure**

Two Types of Radiation



What is Ionizing Radiation?

- Radiation with high enough energy to strip electrons from atoms
- Insidious – harmful in a stealthy manner
  - Alpha particles (α) – He^{+}
  - Beta particles (β^{-}) – electrons
  - Neutrons (N) – slow or fast
  - X-rays
  - Gamma rays

Ionizing Radiation Sources

- X-ray machines
- Electron tubes
- Munitions (depleted uranium)
  - Not a significant hazard if undamaged
  - Inspect for breaks
  - Toxic if ingested (hygiene is key)

Non-Ionizing Radiation

Types of Non-Ionizing Radiation

- Radiofrequency (RF) Radiation
  - Electromagnetic (EM) radiation
- Lasers

Electromagnetic Radiation Hazards

- HERO
  - Hazard of EM Radiation to Ordnance
- HERF
  - Hazard of EM Radiation to Fuel
- HERP
  - Hazard of EM Radiation to Personnel
- PEL = 0.4 watts per kilogram

Radiation Warning Signs

SURFACE WARFARE OFFICERS
SCHOOL COMMAND

Effects of RF Radiation

- Heating of body tissues
- Shocks
- Burns
- Arcs
  - Could cause fuel and ammunition explosion
- Power varies inversely with distance

RF Radiation Requirements

- Warning signs / deck markings
- Observe HERO / HERF restrictions
- Man aloft precautions
- Training

Laser Classes

- Class I - Not hazardous
- Class II - Visible lasers "blink response"
- Class IIIa - Sometimes hazardous for momentary exposure
- Class IIIb - Potentially hazardous
- Class IV - High power, dangerous lasers
  - Strict controls

Laser Power Output

- **Class I - Not hazardous < 0.4 μW**
- **Class II - Low power <1 mW**
- **Class IIIa - Moderate power 1 - 5 mW**
  - **Some require warning labels, some have caution labels**
  - **Depends on amount of radiation exposure produced**
- **Class IIIb - Medium power < 500 mW**
- **Class IV - High power > 500 mW**

Laser Sources

- Rangefinders
- Fiber optics
- Small arms sighting systems
- Landing systems
- Ordnance sighting (LGBs)

Laser System Safety Officer (LSSO)

- **Required if command has Class 3B, 4, or military exempt lasers**
  - **Designated in writing by CO**
  - **Formal training to manage program**
  - **Inventory lasers**
  - **Cannot be Safety Officer (ASO evaluates program for compliance)**

Radiation Hazard Training

- Supervisors shall provide awareness and hazard recognition training for all personnel assigned to work or stand duty in RADHAZ areas to prevent accidental exposure
  - Ensure training is documented

Key People

- CO
- IHO (If assigned)
- Afloat Safety Officer
- EMO
- LSSO
- Reactor Officer / Engineer
- Medical

Any Questions?